

**Grand Canyon National Park,
Desert View**

Improvements for Desert View Wastewater Treatment System

Draft Environmental Assessment **September 2000**

Note to Reviewers and Respondents

If you wish to comment on the environmental assessment, you may mail comments to the name and address below. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the record a respondent's identity, as allowable by law. **If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment.** We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

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RESPONSES DUE JANUARY 5, 2001

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Overview

PURPOSE AND NEED

In accordance with the General Management Plan (GMP, pg 33), the National Park Service (NPS) proposes to improve the Desert View wastewater treatment system, constructed 35 years ago, at Grand Canyon National Park (NP), Coconino County, Arizona. The GMP directs improvement to the existing lagoon treatment system, thus bringing the system into compliance with the National Pollution Discharge Elimination System (NPDES) permit. The facility has been cited by the Arizona Department of Environmental Quality (ADEQ) for permit violations and is currently under an ADEQ consent order to correct the excursions of the effluent limitations. With the increase in visitor and employee facilities at Desert View directed by the GMP, the facility requires rehabilitation and upgrading for efficiency and capacity, as well as to meet federal and state discharge requirements.

MANAGEMENT AND PLANNING HISTORY

The Desert View developed area is located at the eastern entrance of the South Rim of Grand Canyon NP, and consists of a campground, staff residences, general store, tourist shop, administrative offices and facilities, and wastewater treatment facility. Operations guidance in the GMP for the Desert View area includes searching for ways to reduce water use impacts on the park and improving existing lagoons to handle the anticipated increase once developed area improvements are made. The wastewater treatment facility is located in an area well away from management support, staff housing areas and visitor use areas. It is neither visible nor accessible to visitors or residents and is enclosed by a ten-foot fence. This site is not associated with any recreational opportunities. (See Figure 1)

The GMP states that there will be major changes in visitor and employee use patterns at Desert View to minimize land disturbance and to accommodate large numbers of visitors with minimal related conflicts and resource impacts. These changes include expanded visitor parking, a new orientation center, a new entrance station, bike trail, orientation/transit center, public restrooms, campground expansion, and construction of new housing units to replace existing substandard units and to meet additional housing needs. The GMP acknowledges such changes will necessitate expansion of utility systems.

Desert View Wastewater Treatment Improvement Planning History:

In 1966, the existing wastewater treatment facility was designed as a discharging facultative lagoon system with a 1970 projected peak sewage load of 18,000 gallons per day (GPD) or 12.5 gallons per minute. The original facility consisted of two unlined sewage lagoons and a tablet chlorinator that treated the wastewater before discharge. Since 1968, the treatment system has been discharging effluent into a naturally formed ephemeral channel downslope

from the lagoons. There is some riparian habitat along the uppermost 200 to 300 yards of the drainage channel. This may be due to naturally higher soil moisture along the ephemeral drainage as well as to discharge of effluent into the drainage. Desert View is sited upon a topographic upland and runoff near the facility drains down moderate to steep slopes seeping into porous soils over fractured sandstone and limestone with moderate infiltration capacity. Over the years overflow and seepage of treated effluent occurred into the porous soils around the lower lagoons. Soils were exposed to greater than normal levels of water and nutrients. Because of this some exotic vegetative species developed and a number of trees were killed or damaged near the lagoons. The original plans indicated that additional capacity would be handled by addition of another lagoon, additional aeration, or a treatment facility. In the late 1980's a third lined sewage lagoon was added to the existing lagoons increasing the capacity by 1.6 surface acres. Flows into the treatment facility estimated for the year 1997 were 3,840,000 gallons, comparable to the projected flows in the year 2019. However, in 1998 water conservation measures were implemented and total water usage at Desert View dropped to approximately 2.7 million gallons in 1999. Because of the length of wastewater detention time, treated water quality did not meet Biological Oxygen Demand (BOD) discharge requirements of the NPDES permit. In September 1998, Arizona Department of Environmental Quality issued a Consent Order for the park to upgrade the plant so that water quality would meet permit compliance. As an interim measure, the park voluntarily and temporarily halted discharging effluent in 1998. The tablet chlorinator was removed upon cessation of discharge and the park immediately began hauling all wastewater 30 miles to the South Rim Wastewater Treatment Plant (WWTP) for processing. This activity has resulted in an increased use by tanker trucks of the East Rim Drive, a winding and scenic primary road heavily utilized by visitors. Under current conditions, the park will haul 500,000 gallons of sewage in the year 2000. Based upon future growth projections, this amount would increase to 1,500,000 gallons per year by the year 2009 without improvements to the treatment system.

The deficiencies listed by the 1998 ADEQ report are as follows:

- The sewage lift station near the Desert View Observation Tower is old and does not comply with alarm requirements of ADEQ. Further, it does not comply with OSHA air chamber inspectability requirements;
- The treatment facilities do not have influent flow measurement;
- The current wastewater loads may exceed the design capacity of the existing lagoons;
- The treatment facility needs system modifications to meet effluent quality limitations for nitrogen, pH, BOD, and suspended solids.

In 1998, the park contracted with Arber Associates to prepare an engineering report evaluating wastewater system improvements required to accommodate a projected peak month flow of 16,000 GPD based on a park projected 50 percent increase in residential water use. Early in the analysis process the study team concluded that the existing facultative lagoon system could not be upgraded to meet water quality standards. The January 1999 engineering report evaluated the following four treatment and disposal alternatives:

- 1) Total containment
- 2) Septic tank recirculating sand filter and surface discharge.
- 3) Package treatment plant and surface discharge

4) Septic tank recirculating sand filter and subsurface disposal.

A Value Analysis (VA), completed in February 1999, compared five water treatment alternatives: the four listed above and a fifth involving intermittent sand filtration and surface discharge. The VA also evaluated three power supply alternatives including:

- Extend the existing underground electrical grid.
- Install hybrid propane/solar power.
- Install on-site generators.

Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that “[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA’s Section 101. Generally, this means the alternative that causes the least damage to the biological and physical environment. It also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources.” (Council on Environmental Quality, “Forty Most Asked Questions Concerning CEQ’s National Environmental Policy Act Regulations” (40 CFR 1500-1508), *Federal Register* Vol. 46, No. 55, 18026-18038, March 23, 1981: Question 6a.).

Following the Value Analysis Job Plan, and using selection factors from Choosing by Advantages, the environmentally preferred wastewater treatment alternative selected was alternative 2 – this is also the proposed alternative. Alternative 2 involves constructing a septic tank system with recirculating sand filter and surface discharge while upgrading the existing lagoons for continued use. The preferred power supply alternative was alternative A, simply extending the existing underground electrical grid. The proposed new construction would further disturb about 1/4 acre of already disturbed land. It would include several underground concrete vaults for sewage storage, four underground fiberglass tanks with small submersible pumps, and an above ground lined and earth-bermed recirculating sand filter. The projected average daily effluent discharge by the year 2019 is about 7019 GPD, or about 4.9 gallons per minute. This flow rate is approximately equivalent to one-half the flow available (at 60 psi) from a 3/4 inch garden hose. In comparison, the 1968 to 1998 surface discharge flow rate often reached 12.5 gallons per minute. Improvements would result in an approximately 60% reduction in discharge.

ISSUES AND IMPACT TOPICS

The environmental analysis was prepared in accordance with the regulations of the Council on Environmental Policy Act (CEQ) (40 CFR 1500 et seq.) and in part 516 of the U.S. Department of the Interior’s Departmental Manual (516 DM).

The National Environmental Policy Act (NEPA) is the basic national charter for environmental protection; among other actions it calls for an examination of the impacts on the components of affected ecosystems. The 1995 GMP, 1988 NPS Management Policies, and NPS-77 (Natural Resources Management), NPS-12 (National Environmental Policy Act Guidelines) among other

NPS and park policies, provides general direction for the protection of the natural abundance and diversity of the park's naturally occurring communities.

Various agencies have been contacted and consulted as part of this planning and environmental analysis effort. Appropriate federal, state, and local agencies have been contacted for input, review, and permitting in coordination with other legislative and executive requirements.

This environmental assessment provides disclosure of the planning and decision-making process and potential environmental consequences of the alternatives. The analysis of environmental consequences was prepared on the basis of a need to adequately analyze and understand the consequences of the impacts related to the proposed park developments and to involve the public and other agencies in the decision-making process. In implementing this proposal, the NPS would comply with all applicable laws and executive orders.

Issues and concerns affecting this proposal were identified from past NPS planning efforts, environmental groups, and input from other state and federal agencies. The major issues are: conformance of this proposal with the 1995 GMP, natural resource issues including special status species (threatened and endangered species, water quality, air quality, recreational values, cultural (historic and archeological) resources, socioeconomic values, environmental justice, and effects on park operations.

Impact Topics Included in this Document

Soils:

Proposed activities have potential to impact the soil resource, therefore this topic will be briefly analyzed in this document.

Biotic Communities:

Proposed construction would involve disturbance of vegetation communities in a small area. There is the potential to increase disturbance to adjacent biotic communities via the spread of exotic vegetation and noxious weeds. There is the potential for attraction of ungulates to the area of discharge. Therefore, this topic will be analyzed in this document.

Threatened and Endangered Species:

Endangered Species Act of 1973, as amended (16 USC 1531 et seq.). Section 7 of the Endangered Species Act requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats. No listed special status species or critical habitats would be impacted by the proposal. Consultation with the U.S. Fish and Wildlife Service would again be conducted before construction to ensure that no newly listed species have been found on site.

In a letter dated September 17, 1999, (USFWS Reference #2-21-99-I-331), the U.S. Fish and Wildlife Service (USFWS) provided a list of threatened and endangered species for another nearby planning project at Desert View. These species have potential to reside in the Desert View area or depend on it for habitat. Species included the Peregrine falcon, California Condor,

and Mexican Spotted Owl. Therefore, special status species will be addressed as an impact topic in this document.

Cultural Resources:

The NPS is mandated to preserve and protect its cultural resources through the organic act of August 25, 1916, and through specific legislation such as the Antiquities Act of 1906, the National Environmental Policy Act of 1969 (as amended), and the National Historic Preservation Act of 1966, NPS Management Policies, the Cultural Resource Management Guideline (DO-28), and the Advisory Council on Historic Preservation's implementing regulations regarding "Protection of Historic Properties" (36 CFR 800). Other relevant policy directives and legislation are detailed in DO-28.

Section 106 of the National Historic Preservation Act of 1966 requires that federal agencies having direct or indirect jurisdiction over undertakings consider the effect of those undertakings on properties on or eligible for listing on the National Register of Historic Places and afford the Advisory Council on Historic Preservation and the state historic preservation office an opportunity to comment.

Grand Canyon National park has and will continue to consult with affiliated American Indian tribes to develop and accomplish its programs in a way that respects the beliefs, traditions, and other cultural values of the American Indian tribes who have ancestral ties to the lands encompassed by the park. The necessity for consultations with American Indians arises from the historic and current government-to-government relationship of the federal government with the American Indian tribes, particularly those that are federally recognized (*Federal Register* 1995 9250-9255), as well as from the related federal trust responsibility to conserve tribal resources. Consultations with American Indians are also required for compliance with a variety of laws and other legal entities, such as presidential executive orders, proclamations, and memoranda; federal regulations; and agency management policies and directives. Examples are the Indian Self-Determination and Education Assistance Act (1975); The American Indian Religious Freedom Act (1978 and as amended in 1994); the Native American Graves Protection and Repatriation Act (1990); National Historic Preservation Act (as amended in 1992); the Presidential Memorandum of April 29, 1994, entitled "Government-to-Government Relations With Native American Tribal Governments; and Executive Order 13007 of May 24, 1996, entitled "Indian Sacred Sites"

The 1992 amendments to the National Historic Preservation Act and the Archeological Resources Protection Act provide means whereby information about the character, location, or ownership of archeological sites, historic properties, and ethnographic sites, including traditional and cultural sites, might be withheld from public disclosure. This provision is especially important in cases where disclosure could risk harm to the resource or impede the use of a traditional site by practitioners.

Project activities have the potential to affect identified and unidentified archaeological resources contributing to the cultural significance of the area surrounding the storage lagoons. Therefore, cultural resources are analyzed in this document.

Water Quality:

Section 404 of the Clean Water Act (33 USC 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 USC 401 et seq.) - The U.S. Army Corps of Engineers issues permits for work affecting navigable waters and wetlands of the United States. If any unknown hazardous waste

is found in areas proposed for development or visitor use, the NPS would comply with the Comprehensive Environmental Response Compensation and Liability Act (42 USC 9601 et seq.) to determine if resources are being polluted by the substance or if it presents a health and safety issue. If any excavated material is determined to be hazardous, the NPS would comply with the Resource Conservation and Recovery Act (42 USC 6901 et seq.) The ephemeral drainage which would receive surface discharged treated wastewater is defined as a "Waters of the United States." A NPDES permit from the EPA would be required. A State of Arizona Aquifer Protection Permit would also be required.

The NPS seeks to restore, maintain, and enhance the quality of all surface and ground waters within the parks consistent with the 1972 Federal Water Pollution Control Act, as amended, and other applicable federal, state, and local laws and regulations. Water quality limits as prescribed by the NPDES and ADEQ permits are currently being exceeded. Alternatives presented and analyzed in this document could affect federal and state discharge requirements. Therefore, water quality will be addressed as an impact topic in this document.

Visitor Experiences:

Project activities have the potential to affect visitor experience in relation to availability of restrooms. Therefore, visitor experience will be discussed.

Park Operations:

Utilities operations could be affected by alternatives. Therefore, park utility operations will be addressed as an impact topic in this document.

Impact Topics Dismissed from Further Analysis

Air Quality:

Clean Air Act, as amended (42 USC 7401 et seq.). Grand Canyon NP is designated as a class I clean air area. Maximum allowable increases (increments) of sulfur dioxide (SO₂), particulate matter (TSP), and nitrogen oxides (NO_x) beyond baseline concentrations established for class I areas cannot be exceeded. Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations.

If the proposed alternative is selected, local air quality may be temporarily degraded by dust generated from construction activities and emissions from construction equipment. This degradation would last only as long as construction activities occurred and neither overall park air quality nor regional air quality would be affected. For these reasons, air quality was dismissed as an impact topic.

Environmental Justice:

No alternative would have health or environmental effects on minorities or low-income populations or communities as defined in the Environmental Protection Agency's Draft Environmental Justice Guidance (July 1996). Environmental Justice was dismissed as an impact topic in this document.

Floodplains:

Executive Orders 11988 ("Floodplain Management") require an examination of impacts to floodplains. The 1988 NPS Management Guidelines, DO-2 Park Planning, NPS-12 (National Environmental Policy Act Guidelines), and the 1995 GMP provide guidelines on developments proposed in floodplains. Executive Order 11988, "Floodplain Management," requires all federal agencies to avoid construction within the 100-year floodplain unless no other practical alternative exists. Certain construction within a 100-year floodplain requires that a Statement Of Findings be prepared and accompany a Finding Of No Significant Impact. No portions of the proposal are within the 100-year floodplain. Therefore, no Statement Of Findings for floodplains would be prepared. Floodplains were dismissed as an impact topic in this document.

Wetlands:

Soils, hydrology, and vegetation typical of a wetland environment classify jurisdictional wetlands. No jurisdictional wetlands exist at or near Desert View. Therefore, this topic will not be addressed in this document.

Prime and Unique Farmland:

Prime or unique farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. According to the Natural Resource Conservation Service, there are no prime farmlands associated with the project area. Therefore, the topic of prime and unique farmland was dismissed as an impact topic in this document.

Socioeconomic Values:

The local economy and most business of the communities surrounding the park are based on construction, recreation, transportation, tourist sales, services, and educational research; the regional economy is strongly influenced by tourist activity. There may be short-term benefits to the local and regional economy resulting from construction-related expenditures and employment. Local and regional businesses would not be appreciably affected in the long-term. Therefore, socioeconomic values were dismissed as an impact topic in this document.

ALTERNATIVES

Introduction

This section describes two management alternatives for this project. Alternatives were developed to resolve pertinent management issues and address state and federal water quality regulations. In developing alternatives for this project some actions were considered and subsequently dismissed. At the end of the alternatives section is a description of alternatives considered and dismissed and the reasons for dismissal. A summary table comparing the environmental consequences of each alternative is presented at the end of the alternatives section.

Alternative A – No Action

This alternative would involve continuing the present management operation and condition. It does not imply or direct discontinuing the present action or removing existing uses, developments, or facilities. The no action alternative provides a basis for comparing the management direction and environmental consequences of the proposed action.

In this alternative, the Desert View wastewater treatment facility would not be improved. Wastewater would continue to be pumped and hauled to the South Rim WWTP. Under this alternative, park staff will haul approximately 500,000 gallons of wastewater to the South Rim Plant in the year 2000. Improvements and increasing visitation in the Desert View area would continue to place demands on the existing facility that is currently at peak design. It is anticipated that park staff would haul a total of 1,500,000 gallons of wastewater per year in the year 2009. There would be no discharge of effluent under this alternative

Alternative B – Proposed Action

Construction proposed in this alternative would disturb an area of about 1/4 acre. It would involve installation of several underground concrete vaults, underground fiberglass tanks with small submersible pumps, and an above ground lined and earth bermed recirculating sand filter.

The three existing sewage lagoons would be retained with the following additions:

- A recirculating sand filtration system with a Parshall flume influent flow monitor.
- A 32,000 gallon septic tank system
- A 600 sq. ft. recirculation tank containing a timer-controlled sump pump for dosing onto a 3,600 sq. ft. sand filter.
- A tablet chlorination/dechlorination system to disinfect the filter effluent prior to surface discharge.
- 200+ feet of rock-lined trench to carry the treated effluent to a suitable ephemeral channel, lined with fractured bedrock.
- The lift station would be replaced with a duplex submersible, non-clog pump system with a new wet well.

The existing wastewater storage access manhole (6-foot diameter) adjacent to the existing lift station would be modified into a wetwell. Modifications would be to remove the upper cone section of the manhole and replace it with a full-diameter precast section with a flat top containing a rectangular access hatch. The plug and check valves for the pump discharge lines would be housed in a new valve vault.

Electrical power to the treatment plant would be provided from an existing source near the Desert View development. Approximately 2,800 linear feet of buried electrical lines would be provided to the facility. All new facilities would be underground with above ground service ports.

The existing 1.6 surface acres of lagoons would continue to be used and would continue to allow evaporation of approximately 34 percent of the total wastewater. Four (4) acres around the lagoons would continue to be fenced to prevent access by wildlife by wildlife attracted to the scent of water.

Continued operation of the lagoons would reduce the actual 2019 design year high month production of 16,000 GPD to 10,560 GPD. At the end of the wastewater treatment process and following evaporation, 7,019 GPD (4.9 gallons per minute) of treated wastewater (approximately swimming pool quality) would be discharged downslope to an ephemeral channel that is primarily bedrock covered sparsely with thin soils. This flow rate is approximately equivalent to one-half the flow available at 60 psi from a 3/4 inch garden hose. Random pulses or intermittent discharge would be utilized to maximize the infiltration of water. Other local uses for the treated water would also be examined.

General Construction Schedule and Costs:

Construction would take 8-10 months, starting on or about January 1, 2001; however, construction could be delayed by weather conditions or other unexpected events. The net construction cost of this project would be approximately \$724,000 (in 1999 dollars).

Sustainability:

This project would provide tertiary treatment and surface discharge to a projected peak month daily flow of 16,000 GPD by the year 2019. The sustainable component is the low-tech treatment system requiring minimal land disturbance, power consumption, and operating costs. In the event that increased visitation requires additional wastewater treatment capacity, the system can be easily expanded with a second filter bed installation.

MITIGATION MEASURES ON THE PROPOSED ACTION

Mitigation measures are analyzed as part of the action alternatives. These actions have been developed to lessen the adverse effects of the proposed action.

The staging area for the construction office (a trailer) and construction equipment and material storage would be located in previously disturbed areas near the wastewater treatment plant. All staging areas would be returned to preconstruction conditions once construction is complete.

Construction zones would be fenced with construction tape, snow fencing, or some similar material before any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

Soils:

To minimize soil erosion at the project site, standard erosion control measures including silt fence and sandbags would be incorporated into action alternatives. Any revegetation efforts would use site-adapted native species and/or seed. Any trenching operations would use a rock saw, backhoe, and/or trencher, with excavated material side-cast for storage. After trenching is complete, bedding material would be placed and compacted in the bottom of the trench and the utility lines installed in the bedding material. Backfilling and compaction would begin immediately

after the utility lines are placed into the trench and the trench surface would be returned to preconstruction contours. All trenching restoration operations would follow guidelines approved by park staff. Compacted soils would be scarified and original contours reestablished.

Biotic Communities:

To prevent and minimize the spread of exotic vegetation and noxious weeds, the following mitigation measures would be implemented:

Existing populations of exotic vegetation at the construction site would be treated prior to construction activities.

- All construction equipment that would leave the road would be pressure washed prior to entering the park.
- The location of the staging area would be limited to existing roads or the disturbed area.
- Parking of vehicles would be limited to the staging area and existing roads.
- Any fill materials would be obtained from a park-approved source.
- All areas disturbed by construction would be revegetated using site-adapted native seed and plants.

The potential for attraction of ungulates to the area of discharge will be mitigated by randomly pulsing the discharge downslope into the ephemeral channel lined in fractured bedrock. This would facilitate infiltration and evaporation of discharge thereby reducing the available water on the surface.

Threatened and Endangered / Special Status Species:

Construction workers and supervisors would be informed about special status species. Contract provisions require the cessation of construction activities until park staff re-evaluates the project and would allow modification of the contract for any protection measures determined necessary to protect the discovery.

Cultural Resources:

If previously unknown archeological resources are discovered during construction, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed, if necessary, in accordance with the stipulations of the 1995 *Programmatic Agreement Among the National Park Service, the Arizona State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the General Management Plan/Environmental Impact Statement, Grand Canyon National Park, Arizona*.

All workers would be informed of the penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers would also be informed of the correct procedures if previously unknown resources were uncovered during construction activities. Data recovery excavations would be carried out to mitigate adverse affects as outlined in the section on environmental consequences.

The NPS has conducted archeological surveys to identify resources in the area of project affect. Data recovery excavations would be undertaken to mitigate unavoidable adverse affects to identified sites. Should unknown buried deposits be located, data recovery excavations would be undertaken. These subsurface survey and data recovery efforts would be guided by a project-specific research design. Additionally, the NPS would begin consultations under the Native American Graves Protection and Repatriation Act in the event that buried human remains are discovered during archeological excavations or project development.

ALTERNATIVES CONSIDERED AND DISMISSED

Following is a list of possible treatment alternatives that were considered and dismissed through the value analysis process and the reasons why they were dismissed.

Alternative 1 - Replace public water based restrooms with composting toilets.

Engineering evaluations during 1988 indicated that more than half of the water consumption at Desert View was for public restrooms. This alternative would replace all public restrooms with a large composting toilet comfort station. The resulting reduction in wastewater flow, along with minor upgrades to the existing sewage lagoons would result in no discharge. The upgraded lagoons would provide total containment with minimal ground disturbance. This alternative was dismissed because of NPS Director's Order #83 Public Health, which mandates composting toilets are not to be used in front country areas. The NPS has experienced operational problems where composting toilets are subjected to heavy use.

Alternative 2 - Septic tank with lined recirculating sand filter and subsurface drip irrigation.

In this alternative, the new wastewater treatment facility would be a recirculating sand filter plant followed by subsurface drip irrigation. The recirculating sand filter system would consist of influent flow monitoring, septic tank system, and a recirculation tank containing a timer-controlled sump pump for dosing onto a sand filter. Drip irrigation would be accomplished by pumping the chlorine contact chamber effluent to shallow buried grids of perforated piping covering an area of about 3.1 acres. The existing lagoons would be used for emergency backup to minimize discharge monitoring. This alternative was dismissed due to excessive impacts to undisturbed areas and high capital cost.

Alternative 3 - Packaged activated sludge treatment system and surface discharge.

In this alternative, a new packaged activated sludge treatment plant would be followed by surface discharge. The unit processes of the treatment system would include a bar screen, a flume for influent flow metering, a flow equalization basin with submersible duplex grinder pumping system, a biological oxidation process, clarification, a sludge holding/treatment reactor, and tablet chlorination/ dechlorination. The package plant would include air blowers that would be housed. This alternative was dismissed because of unsustainability due to high electrical usage, and excessive operational requirements.

Alternative 4 - Lined intermittent sand filter and surface discharge.

In this alternative, an intermittent sand filtration plant would be followed by surface discharge. A septic tank and an intermittent dosing tank would precede the intermittent filter. Tablet chlorination/dechlorination would be used to disinfect the filter effluent prior to surface discharge. A dosing siphon would be used to load the filters and the only electricity required would be supplied by a solar panel for the influent wastewater flow monitoring. This alternative was dismissed because of additional operational and undisturbed land area requirements.

Alternative 5 -Total containment.

In this alternative, total containment and evaporation of all wastewater would be achieved through the construction of two additional lagoons. The existing 1.6 acre surface area lagoon system would be increased to a 4.4 acre surface area system to handle the projected 4,000,000 gallon per year Desert View wastewater flow. A total of approximately 8 acres of vegetated land would be destroyed for construction of the ponds. The existing influent splitter structure would be modified so that flow could be piped to all lagoons. Maintenance requirements include removal of solids from the lagoons every several years. A mechanical means of increasing evaporation would also be required. This alternative was dismissed because of the high capital cost and significant loss of natural and cultural resources.

AFFECTED ENVIRONMENT

Detailed information on resources in Grand Canyon NP may be found in the 1995 GMP/EIS. A summary of the resources associated with this project follows.

Desert View Development:

The Desert View developed area is located at the eastern entrance of the South Rim of Grand Canyon NP, and consists of a campground, staff residences, general store, tourist shop, administrative offices and facilities, and wastewater treatment facility.

Wastewater Treatment Facility:

The Desert View facility is described in the "Management and Planning History" section of this document. Currently, the principal Operations and Management (O&M) cost for the Desert View wastewater treatment facility is hauling wastewater from the Desert View lagoons to the South Rim WWTP. The 1999 O&M costs were \$95,000 for hauling and \$3,500 for inspection and maintenance. This is an expensive operation, time consuming for park staff, and alternatives are being examined.

The Desert View facility operates under a NPDES permit administrated by the US EPA Region 9. This permit established the required effluent quality based upon a design capacity of 0.04 million gallons per day. The quality of the water is the same as that of a public swimming pool. The discharge permit has no flow limitation. The NPDES permit was due for renewal in March 1998; however, the permit has not yet been renewed.

Future water use projections with conservation and growth are based on projections using a study period to 2019. Visitor use is expected to increase 75 percent between now and 2009 and then remain constant through 2019. Residential use during the study period is expected to

increase 50 percent. By 2019, the annual wastewater flow would be 4 million gallons with an average daily flow of 11,000 gallons. It is anticipated that any future planning for the Desert View area would include methods to reuse and recycle treated water. A summary of the current and projected future water use at the Desert View area is shown in Table 1 in the appendix.

Natural Resources

Soils:

Desert View is on the Coconino Plateau which is capped by the Kaibab Formation. In the vicinity of the project site, the Kaibab Formation consists of sandstones, redbeds, chert, dolomite, and some limestone (NRCS 2000). Soils in the project area are shallow, poorly developed, and stable (NPS 1995). Soils derived from the Kaibab Formation are generally characterized by moderate to high infiltration capacity, low moisture holding capacity, and low soil fertility (Roundy 1996). They are prone to deep desiccation during the summer.

Biotic Community:

The dominant vegetation community type around Desert View is juniper/big sagebrush/pinyon pine (*Juniperus osteosperma*/*Artemisia tridentata*/*Pinus edulis*). Total cover is 20 to 50 percent in general with understory species diversity very low. Typical understory species include blue grama, bluegrass, snakeweed, prickly pear, and rabbitbrush. A wide variety of transient, seasonal, or permanent birds and small mammals are common in Desert View may be found in the project area at one time or another. Commonly seen birds include Steller's jay, piñon jay, raven, violet-green swallow, white-throated swift, hairy and Lewis's woodpecker, rock wren, plain titmouse, several nuthatch species, mountain and western bluebird, mountain chickadee, common bushtit, and black-chinned and broad-tailed hummingbirds. Raptors include red-tailed and sharp-shinned hawks, great horned owl, and the occasional peregrine falcon. Small mammals include the Abert squirrel, rock squirrel, golden-mantled ground squirrel, pocket gopher, striped skunk, deer mouse and piñon mouse, and voles. Coyote, gray fox, and bobcat are frequent visitors. The only large mammals frequently observed are mule deer, elk, and coyote.

Threatened and Endangered / Special Status Species:

Park staff frequently inventories the Desert View site for federally listed species and State of Arizona listed species. Most recently, the site was surveyed in 1998, 1999, and the winter of 2000 for the federally listed endangered peregrine falcons (*Falco peregrinus*), the endangered California condor (*Gymnops californianus*), the threatened Mexican spotted owl (*Strix occidentalis lucida*), and the threatened bald eagle (*Haliaeetus leucocephalus*).

- **Peregrine Falcon:** The project site lagoon area is about 0.75 miles from an active peregrine falcon eyre location. A pair of peregrine falcons has consistently occupied this territory since 1988. These birds have demonstrated considerable tolerance to human activity over the years. Although the peregrine falcon was delisted in 1999, the species is treated as a threatened species for an additional five years, requiring continued monitoring.
- **California Condor:** The Desert View area is a site of recurrent sitings of an experimental population of juvenile California condors. Condor activities include foraging and roosting and, as the birds mature, may include nesting. Although there are presently no known

condor nest sites around Desert View, there are vulture nests and condors have been known to take over vulture nests. It is possible a condor nest could be established near Desert View below the rim.

- Mexican Spotted Owl: There are no Mexican spotted owl surveys for the Desert View area although potential suitable habitat exists. There is a possibility the owls may be present over the rim of the canyon and may be hunting and nesting within the canyon. There will be no affect on Mexican Spotted Owls, therefore no consultation with Fish and Wildlife Service was required.
- Bald Eagle: The bald eagle is an occasional transient of Desert View. Although individual eagles occasionally fly over Desert View, they do not depend on it for hunting, roosting, or nesting.

Vegetation/Habitat Type of the Proposed Surface Discharge Area:

The proposed area for surface discharge of the treated wastewater was surveyed on September 30, 1999, by the park botanist. The proposed site is an ephemeral drainage and vegetation is typical of a pinyon-juniper woodland at ca. 7,400 foot elevation. As one descends the ephemeral drainage the slope steepens and shading affords more mesic conditions, with the inclusion of ponderosa pine (*Pinus ponderosa*), snowberry (*Symphoricarpos* sp.), and wax currant (*Ribes cereum*). During the survey, the drainage above the proposed point of discharge had no flow, but it was apparent that recent monsoon rains had contributed some flow. Another small drainage contributing seasonal runoff joins this drainage near the discharge point about 300 yards below the sewage treatment lagoons. Plants in the reaches where the drainage became entrenched (at the point of discharge), include an umbel (*Lomatium* sp.), redroot buckwheat (*Eriogonum racemosum*), pusseytoes (*Antennaria* sp.), penstemon (*Penstemon barbatus*), an amaranth (*Amaranthus* sp.), sagebrush (*Artemisia tridentata*, *A. ludoviciana*, and *A. nova*), grizzly bear prickly pear (*Opuntia erinacea*), horsebrush (*Tetradymia canescens*), side-oats grama (*Bouteloua curtipendula*), rabbitbrush (*Chrysothamnus nauseosus*), mahonia (*Berberis repens*), brickle bush (*Brickellia californica*), algerita (*Berberis fremontii*), mutton grass (*Poa fendleriana*), Apache plume (*Fallugia paradoxa*), and Nevada Mormon tea (*Ephedra nevadensis*). Near the sewage lagoons, there were approximately 50 to 60 dead snags of pinyon pine and Utah juniper standing in the ephemeral drainage to a distance of approximately 300 yards. The tree death appears to have occurred 2 to 5 years ago, as most of the needles of the pinyon have been shed. Not all of the trees in the drainage channel were dead, but the tree death was continuous for most of the 300 yards. Tree death can result from root rot caused by an excess of water or nutrients. Overflow and seepage along the lower lagoons may have resulted in long-term increased soil moisture and nutrient levels. There is historical (hundreds to thousands of years) evidence of high flows in the channel. This includes plunge pools, rounded boulders, and smooth, water-worn ledges of Kaibab Limestone. Smooth rock surfaces were coated with lichens and in areas where the surfaces were shaded, mosses were evident. There is recent evidence of high flows as shown by vegetation debris caught on downed snags across the drainage at levels of 12 to 24 inches above the channel bottom.

Cultural Resources

Project Area Sites: NPS archeologists completed pedestrian surveys of the area potentially affected by the proposed undertaking during the fall of 1999. Three archeological sites were identified within the 7-acre survey area:

C:13:444 – The site appears to be a food processing area associated with historic period Navajo subsistence activities (AD 1800 –1900). Artifacts were identified scattered over a 10 x 16-meter area consisting of over 50 Navajo Utility Ware sherds, 2 Jeddito Plain Ware sherds, and 1 Tusayan Corrugated sherd (possibly an intrusive artifact from nearby site C:13:520). Three groundstone metate fragments and 1 mano fragment were also identified. According to archeological observations made in 1991, the groundstone artifacts may have been brought to the surface during previous excavation of a utility line, which partially exposed and disturbed the site.

C:13:520 – This site covers a large area (98 x 146 meters) and consists of four light-density artifact concentrations. Archeological evidence indicates occupation of the site by Ancestral Puebloan people (Kayenta Anasazi) sometime between AD 1050 to 1275. The artifact concentrations may represent different activity areas associated with a single occupational episode, or perhaps multiple visits over time to the same area. "Concentration One" consists of 2 biface preforms, a projectile point fragment, 11 pieces of debitage, a metate, groundstone fragments, ceramic sherds, and a 2 meter-long rock alignment. "Concentration Two" consists of 10 pieces of debitage, over 7 ceramic sherds, and a groundstone fragment. "Concentration Three" consists of a groundstone artifact scatter that includes a mano, a metate, and 2 unidentified fragments. "Concentration Four" consists of 8 pieces of debitage, a retouched flake, and a Tapeats sandstone mano fragment. Additional groundstone fragments and a retouched flake were identified within the site boundaries that were not associated with the artifact concentrations. Lithic material identified at the site is predominately of local Kaibab chert, although local jasper was also utilized. Ceramic material and types include Deadman's Gray Ware, Tesi Orange, Tusayan Corrugated, Tusayan White Ware, and Tusayan Gray Ware.

C:13:551 – This site is a light density artifact scatter distributed over a 15 x 20-meter area. It may represent a lithic prospect area utilized by Cohonina or Ancestral Puebloan people between AD 700 to 1050. Over 20 pieces of Kaibab chert debitage were identified, consisting of tested chert nodules, and primary and secondary flakes. Chert nodules were found exposed and eroding out of the surface. A single ceramic sherd of Deadman's Fugitive Red was also identified.

All three sites are recommended eligible for the National Register of Historic Places under the park's existing national register nomination ("Archeological Resources of Grand Canyon National Park"). The multiple-property nomination is in the process of being finalized.

The archeological survey area extended approximately ¼ mile downslope from the sewage disposal lagoons. Because of previous erosion, it is unlikely that intact archeological resources are present along this section of the drainage.

There are no other identified cultural resources within the project area, including ethnographic resources. Copies of the environmental assessment will be forwarded to the tribes traditionally affiliated with Grand Canyon National Park, for review and comment. If tribal representatives subsequently identify the presence of ethnographic resources, appropriate mitigation measure would be undertaken in consultation with the tribes. The location of ethnographic sites would not be made public. In the unlikely event that human remains, funerary objects, sacred objects, or objects

of cultural patrimony are discovered during construction, provisions outlined the Native American Graves Protection Repatriation Act (25 USC 3001) of 1990 would be followed.

ENVIRONMENTAL CONSEQUENCES

Introduction

The National Environmental Policy Act (NEPA) requires that environmental documents disclose the environmental impacts of the proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the proposed action be implemented. This section analyzes the environmental impacts of the two alternatives for the Desert View facility improvements on natural resources (biotic communities, wetlands, special status species, water quality), cultural resources, recreational values, and park operations. This analysis provides the basis for comparing the effects of the alternatives. The intensity and duration of the impacts, mitigation measures and cumulative impacts were assessed in considering the impacts.

Methodology

The NPS based impact analysis and conclusions in this documentation on the review of existing literature and park studies; information provided by experts within the National Park Service, US Fish and Wildlife Service, the US Army Corps of Engineers, and other agencies; and professional judgments of park technical experts.

In February 2000, the NPS contracted with Richard P. Arber Associates, Inc., a private engineering firm, to model the anticipated surface discharge in design year 2019 from the improved Desert View facility. Historically, discharge has had no effect on water quality in the area and the discharge has never gone further than about 1500 feet down slope. The purpose of the model was to theoretically model and analyze the discharge to allow a comparison with the observed effects of the historical discharge. The resulting engineering report, *Desert View Wastewater Discharge Modeling*, was released on March 27, 2000. Copies of the report are available at Grand Canyon National Park headquarters. The model was based on the Proposed Action of continuing to use the existing lagoons for holding and evaporative purposes.

The engineering report provided an analysis of the extent of effects of the discharge assuming an artificial condition of no infiltration of water. This analysis determined the length of channel required to store the discharge until an evapotranspiration equilibrium was reached. The report also provided an analysis of the extent of the effects of the discharge using the normal infiltration rates for fine grained soils.

The report indicates that neglecting natural infiltration, the expected future discharge would require an area of between 0.5 to 3.5 acres to reach an equilibrium with evapotranspiration rates, with the large areas occurring in the colder months. Using a assumed evaporation width of 10 feet this would translate to a length between 0.4 to 2.9 miles

The report also indicates that using a normal infiltration rate for fine-grained soils, the area required to evaporate the proposed effluent rates would be 0.02 to 0.047 acres. This model indicates that the discharge would affect an area no longer than about 300 feet. This is a significant decrease in the area historically affected and the water discharged will meet state water quality standards.

In reality, the actual effects will fall somewhere between the two models. Observed effects of the historical discharge into the drainage area range from 1,500 to 1,700 feet.

Thresholds of Change

Intensity

The thresholds of change of an impact are designated as intensity and duration. For the purposes of this analysis, intensity or severity of the impact is defined as follows:

- Negligible-impact to the resource or discipline is barely perceptible and not measurable and confined to a small area.
- Minor-impact to the resource or discipline is perceptible and measurable and is localized.
- Moderate-impact is clearly detectable and could have appreciable effect on the resource or discipline.
- Major-impact would have a substantial, highly noticeable influence on the resource or discipline.

Duration

The duration of the impacts in this analysis is defined as follows:

- Short term-impacts are those that occur during implementation of the alternative, including construction activities.
- Long term-impacts would extend beyond implementation of the alternative and would likely have permanent effects on the resource or discipline.

Cumulative Impacts

A cumulative impact is described in regulations developed by the Council on Environmental Quality (CEQ), 40 CFR 1508.7. A "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time.

Cumulative impacts were determined by combining the impact of the Desert View wastewater treatment facility improvement alternatives with potential impacts of other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or foreseeable future projects within Grand Canyon NP and the surrounding region. The projects identified include implementing the 1995 Grand Canyon NP GMP. At Desert View, current and future planning includes constructing approximately 70 new housing units to replace about 10 substandard units and meet additional housing needs (this would nearly double the projected peak flow month of July 2019). A Village to Desert View greenway (a 20 mile long bike trail between the Village and Desert View). A new Desert View entrance station, new emergency services building, new parking lot, concession housing, water distribution improvements, prescribed fire plan, bike rental concession, forest restoration program, and water distribution improvements. Twenty miles to the east of Desert View, a light rail transportation system would

be constructed between the community of Tusayan, just south of the southern park boundary, north to Mather Point, then west to the South Rim Power Station. A plan is underway to relocate the South Rim maintenance and warehouse facility and construct adjacent to it a shuttle bus/light rail train storage and maintenance area to support the light rail. Throughout the park there would be construction, rehabilitation, and repair of 38 restrooms. Approximately 450 new parking spaces would be provided and a presently undetermined number of visitor service buildings would be built in previously disturbed areas within the walking distance of the rim. Housing would be developed in a disturbed area southeast of Arizona Highway 64; any housing that does not fit within this heavily disturbed area would be tightly clustered in areas where utility extensions already exist. At the South Rim, all housing would be removed from the Grand Canyon National Park Lodges (GCNPL) area just south of the existing parking lot, and this area would be converted to a transit facility and parking lot. A new employee laundry and lounge would be built in the consolidated housing area. Existing management support facilities would be retained except for the construction of a new maintenance building for GCNPL and a new NPS ranger operations and maintenance facility. These facilities would be located in previously disturbed areas currently occupied by substandard management support facilities and housing.

Cumulatively, these ongoing actions would result in a major long-term adverse impact to the present waste water treatment facility at Desert View. However, the proposed action will greatly enhance the ability of the waste water treatment facility to handle the increased activity while reducing the impacts to negligible long term biotic effects, negligible short term effects on threatened or endangered species, minor long term effects to soils along the drainage, and major long term positive effects on visitor services.

ALTERNATIVE A – NO ACTION

Soils and Biotic Communities

No new construction would be proposed. There would be no new adverse impacts to soils or biotic communities. Excessive wastewater would continue to be pumped from the Desert View sewage lagoons and hauled to the South Rim WWTP for treatment.

Conclusion: There would be no new adverse impacts to soils or biotic communities.

Threatened and Endangered / Special Status Species

No new construction would take place at the Desert View sewage lagoons. There would be no change over existing conditions. No short or long term impacts to peregrine falcons, Mexican spotted owls, or the California condor would be expected.

Conclusion: No short or long term impacts to any special status species would be expected.

Cultural Resources

Under the No Action alternative, the three identified archeological sites in the project area would be protected and preserved in place in accordance with NPS cultural resource policies and guidelines. The sites are in proximity to the existing sewage lagoons, and appropriate long-term provisions for carrying out site avoidance by ongoing maintenance activities would need to be implemented to ensure resource protection.

Conclusion: There would be no effect to identified archeological resources. Long-term measures would be implemented to ensure that archeological sites are avoided by ongoing maintenance activities.

Water Quality

The present effluent exceeds NPDES and ADEQ quality limitations for nitrogen, pH, BOD, and suspended solids. The wastewater treatment facility would not be improved to meet these limitations. Because effluent levels in the lagoons would be monitored, the likelihood of accidental surface discharges would be appreciably reduced. However, any inadvertent discharge would be a single pulse and quickly dissipated. This would be a short term and negligible impact to local soil moisture quality of the discharge area. The park would continue to monitor levels in the lagoons and should a possible discharge be anticipated, excess effluent would be pumped from the lagoons and hauled to the South Rim WWTP for treatment.

Conclusion: If an inadvertent discharge would take place, it would be a short term event, quickly dissipated with negligible impact to the adjacent habitat. The park would continue to haul excess wastewater from the lagoons to the South Rim WWTP for treatment.

Visitor Experience

The wastewater treatment plant does not have the capacity to handle the proposed development in the Desert View area. Restrooms and water fountains would have to be closed and visitors redirected to other facilities closer to the South Rim developed area. One and a half million gallons of effluent a year would continue to be hauled by truck back to the south rim waste water treatment.

Conclusion: Visitors would experience a long term inconvenience due to anticipated closure of restrooms and water fountains if the wastewater treatment plant must be closed due to lack of capacity and failure to comply with federal and state regulations. This would have a major impact to the visitor experience. Hauling effluent by truck would have a long term effect on visitor experience due to traffic and safety issues on Highway 64.

Park Operations

Annual O&M costs would begin at the 1999 amount, about \$98,500 and rise to \$300,00 by the year 2009. Park staff would continue to be required to pump the lagoons and haul wastewater to the South Rim WWTP, with trips per year increasing to 300 or more in 2009. The deficiencies detailed in the ADEQ citation would not be corrected. These deficiencies include sewage lift station noncompliance with alarm requirements of ADEQ and OSHA air chamber inspectability requirements. The lagoons would not have influent flow measurement. The current wastewater loads could continue to occasionally exceed the design capacity of the lagoons. The system would not be modified to adequately meet effluent quality limitations for nitrogen, pH, BOD, and suspended solids. Park staff would be required to continue monitoring levels in the lagoons, and, as needed, to pump the lagoons and truck the wastewater to the South Rim WWTP. Additionally, park staff would be required to explore methods and techniques to modify the existing wastewater treatment process in order to meet ADEQ effluent quality limitations for nitrogen, pH, BOD, and suspended solids. Depending on the time involved with such research and how successful the attempts are, eventually more time and funds could be spent searching for other control methods than would have been spent should the proposed action be implemented. Additionally, there would be no guarantee any other methods would be successful in meeting ADEQ requirements. If the Desert View waste water treatment facility is

closed for any amount of time, the Desert View developed area could also be closed for as long as it would take to conduct corrective actions. Grand Canyon National Park would accrue monetary stipulated penalties by exceeding Arizona Department of Environmental Quality water quality limits. Additional park protection ranger staff would probably be assigned to the Desert View area to manage detour traffic and inform visitors the site is closed. This would result in an unplanned expenditure of park economic resources.

Conclusion: This no action alternative would result in a long term moderate impact on park operations. ADEQ and OSHA limits would continue to be exceeded. Park staff would still be required to pump the lagoons and truck wastewater to the South Rim WWTP. Park staff would spend more time and funds searching for other control methods than would have been spent should the proposed action be implemented, with no guarantee of success. If the facility is closed for any amount of time the Desert View developed area could also be closed. Additional staff would be required to manage detour traffic and inform visitors the site is closed.

ALTERNATIVE B – PROPOSED ACTION

Soils

The construction zone surrounding the project site would be subject to temporary soil compaction by equipment. Some vegetation would be removed and salvaged for revegetation projects. Impacts on soils within the construction zones would be mitigated by defining the construction zones with construction tape or fencing, installing soil erosion devices and implementing measures as described in the "Mitigation Measures" section above. Efforts would be made to remove established exotic plants in compliance with Executive Order (13112) on exotics.

Some soils would be covered with impermeable materials. Following construction, disturbed areas within the construction zone would be returned to natural conditions. Compacted areas would be scarified and preconstruction contours reestablished. Areas disturbed by construction would either be allowed to revegetate naturally or revegetated with species native to the immediate area. Revegetation would facilitate soil stability, help to reduce runoff and erosion, and help the soil to restore itself to natural conditions.

Regarding the reintroduction of effluent into the ephemeral drainage channel, there would be minor impacts to channel morphology as a result of the surface discharge. Maximum flow rates are estimated to be about 0.025 cubic feet per second (4.9 gpm) without lagoon attenuation during the largest flow month, July. Hydraulic analysis shows that flows of this size are very shallow (about 1 inch) relative to natural channel dimensions and too small to significantly alter physical characteristics of the channel.

Conclusions: There would be minor long-term impacts to the soils as a result of implementation of the proposed action.

Biotic Communities

Impacts on about 1/4 acre of previously disturbed Juniper/Big Sagebrush/Pinyon Pine association would be caused by constructing the wastewater treatment facilities. However, with the exception of service ports, all facilities would be underground and the ground surface would be recontoured and revegetated. Indirect impacts on vegetation can be expected as the result of compacted soils from construction equipment and activities and human trampling. Piñon/juniper and big sagebrush habitats are common habitats found throughout the region and

on the South Rim; most of the existing South Rim developments have occurred in these habitats. As a result of these development actions, some degree of habitat fragmentation has already occurred.

At the Desert View wastewater treatment facility site, it would be anticipated that the loss of wildlife would be proportional to the amount of habitat lost and altered. The project site has been previously affected because of the Desert View development itself, the sewage lagoons, nearby utility corridors and roads, and attendant human activity. Overall populations of affected species would be slightly and temporarily lowered during construction; however, once construction was completed and mitigation measures employed, population levels would be expected to recover to some degree. Grasses, forbs, and similar species, both native and non-native, have historically colonized, and may continue to colonize the area of higher moisture conditions within and immediately adjacent to the drainage.

Conclusion: Impacts to about 1/4 acre of previously impacted Juniper/Big Sagebrush/Pinyon Pine association habitat to improve the Desert View facility would result in a minor effect on the overall communities or their species composition at Desert View.

Discharge Site

The point of discharge is a natural ephemeral channel easily capable of handling the anticipated randomly pulsed discharge equal to one half of the flow from a typical garden hose. The discharge may modify the drainage habitat immediately within and adjacent to the channel as long as the discharge continues, although significantly less than historic discharges.

Conclusion: Overall, improvements at the Desert View wastewater facility itself would have negligible long-term impacts to a area with a thirty year history of disturbance.

Threatened and Endangered / Special Status Species

Peregrine falcons: The project site lagoon area is about 0.75 miles from a peregrine falcon eyre location. If blasting would be required, all specifications, techniques, timing and duration of events and amount of explosives would first be evaluated by park resource staff on an as needed and case by case basis. Approval by resource staff would be required before any blasting. Construction activities associated with improving the Desert View facility would not adversely affect foraging or nesting behavior of the pair of peregrine falcons occupying this territory since 1988. Populations of peregrine falcon prey species may be attracted to the surface discharge because of the potential increase in prey species. This would be a positive long-term impact.

California Condor: The experimental population of condors in the area may avoid flying over the project site during construction, but would be expected to return once construction would be complete. As stated in the Affected Environment section above, it is possible that a condor nest could be established near Desert View below the rim. Before and during construction suitable condor nesting areas within one mile of Desert View would be frequently surveyed for active condor nests. If such a nest was discovered, construction activities may impact condor nesting behavior and success. If a nest is discovered, consultation would be initiated with the USFWS and appropriate mitigation measures initiated. The re-establishment of discharge flows (initiated in 1964 and continuing to 1998 at one third the historic discharge rate) may attract Condors to the area because of the change in food sources. This may affect their foraging and roosting behavior. This would be a minor long-term impact.

Mexican Spotted Owl: There are no Mexican spotted owl surveys for the Desert View area although potential suitable habitat exists. There is a possibility the owls may be present over the rim of the canyon and may be hunting and nesting within the canyon. There would be no impact to spotted owl nesting or roosting habitat. Desert View development is not likely to adversely affect the spotted owl.

Conclusion: Peregrine falcon - Construction activities associated with improving the Desert View wastewater treatment facility itself would not be expected to adversely affect foraging or nesting behavior of peregrine falcons. The falcons could be attracted to the discharge thus resulting in a minor long-term impact to their foraging behavior. California condor - Suitable nesting sites within 1 mile of Desert View for the experimental population of condors would be inspected previous to and during construction. If an active condor nest is discovered, mitigative consultation would be initiated with USFWS. Mexican Spotted Owl - There would be no impact to spotted owl nesting or roosting habitat. Desert View development is not likely to adversely affect the spotted owl.

Cultural Resources

Proposed wastewater treatment improvements would likely impact all or portions of two of the three archeological sites identified in the project area. Sites C:13:444 and C:13:520 would be disturbed by pipeline and sand filter construction in the vicinity of the existing sewage lagoons. The sites cannot be reasonably avoided by project redesign. However, site C:13:551 lies outside the area of anticipated project disturbance and would be avoided.

In accordance with regulations of the Advisory Council On Historic Preservation (in particular 36 CFR 800.5 & 800.6) and the 1995 Programmatic Agreement regarding the draft General Management Plan/Environmental Impact Statement for Grand Canyon National Park, the NPS would consult with the Arizona State Historic Preservation Office and concerned American Indian tribal officials to reach agreement on appropriate mitigation of adverse effects. Mitigation would likely consist of archeological data recovery excavations carried out in accordance with approved federal and state standards and guidelines. Archeological monitoring during construction may also be recommended as a further mitigation measure.

Conclusion: Proposed facility improvements would result in moderate long-term effects on two archeological sites in the project area. The NPS would mitigate adverse effects by data recovery excavations carried out in advance of construction, and in accordance with a plan approved in consultation with the Arizona State Historic Preservation Office and concerned tribal officials.

Water Quality

The treated effluent from the improved treatment process would be tertiary quality (swimming pool quality). The proposed surface discharge of treated effluent would meet all NPDES and ADEQ quality limitations for nitrogen, pH, BOD, and suspended solids. During construction, storm runoff water quality would be adequately protected through mitigation measures such as silt fencing. Some minor temporary impacts could occur. Throughout all aspects of the project, water quality would be maintained at or above minimum levels required by the State of Arizona Water Quality Control Board. Mitigation measures would include best management practices to catch any spilled material, ensure erosion control, and revegetative actions during the post-construction period. Impacts to surface water quality would be minimal and short term and result mostly from surface runoff of bare, exposed soils. Any disturbed areas would be returned to natural contours and revegetated or allowed to revegetate naturally. Impacts to surface water

quality as a result of improving the existing wastewater treatment facility, restoring natural contours, and revegetation would be expected to be minimal and last only as long as it takes to conduct this project element.

Conclusion: All NPDES and ADEQ surface discharge requirements for treated effluent would be met. There would be negligible short-term impacts to water quality should this alternative be implemented.

Visitor Experience

There would be no negative impact to visitor experience as restrooms and water fountains would continue to be available. With development of Desert View, there would be an increase in the number of facilities available enhancing visitor experience.

Conclusion: There would be a positive and moderate long-term impact to visitor experience with the continued function and addition of restrooms and water fountains and improved wastewater treatment facilities.

Park Operations

During construction, the facility would continue to operate. There would be moderate long-term positive impacts to park operations because the improved lift station would comply with alarm requirements of ADEQ and OSHA air chamber inspectability requirements. The treatment facilities would have influent flow measurement and the facility itself would meet effluent quality limitations for nitrogen, pH, BOD, and suspended solids. Thus, improving and updating the automation of the wastewater treatment system would have a positive affect on park operations. Modifications to the facility would result in a facility that would meet federal emergency power and redundancy criteria as well as current Uniform Building Code (UBC) and National Fire Protection Association (NFPA) codes. The facility would be operated with minimal staff. Staff time and equipment would not be required to pump the lagoons and haul wastewater to the South Rim WWTP. This would also increase visitor safety and experience by removing large tanker trucks from the scenic road between Desert View and South Rim. No other treatment alternatives would need to be designed or tested. Annual operation and maintenance (O&M) costs would be about \$48,000. Mechanical plant operations, time of operation, and utilization of staff time would be much more cost effective and efficient over present conditions and result in a substantial decrease in annual operation and maintenance costs over present conditions. The Desert View area would not be at risk of closure to visitor use. Park protection ranger staff would not be required to manage traffic due to area closure.

Conclusion: There would be positive and moderate long term impacts to park operations because the improved facility would comply with alarm requirements of ADEQ and OSHA air chamber inspectability requirements. The proposed facility would be more cost effective, both in terms of operating dollars and operation time, over the present system and result in a substantial decrease in annual operation and maintenance costs over present conditions. Park protection ranger staff would not be required to manage traffic due to area closure.

CUMMULATIVE EFFECTS

Past, present, and future actions considered in this cumulative assessment are as follows: 1) the approved actions presented in the 1995 Grand Canyon National Park GMP/EIS; 2) other

actions for the Desert View developed area; and 3) other land use activities within and outside the park that would have a cumulative effect on the use and operation of the Desert View wastewater treatment facility, particularly the area affected by surface discharge of treated wastewater as described in the Proposed Action Alternative now under consideration.

The following analysis is for topics having impacts of a cumulative nature; other topics (such as socioeconomic, air quality, prime and unique farmland, etc.) were examined, but determined to have negligible cumulative effects and are therefore not included here.

Alternative A – No Action (Existing Trends Continue)

For the purposes of this assessment, No Action assumes only routine maintenance and repair would occur to the Desert View facility and that park staff would still be required to pump the lagoons and truck effluent to the South Rim WWTP.

No improvements would take place at the Desert View wastewater facility; there would be no immediate local or regional cumulative impacts to any natural or cultural resources as the result of the No Action alternative. However, the park would be required to continue to haul wastewater from the Desert View wastewater treatment facility to the South Rim WWTP along a winding scenic rim road. Although the risk of wastewater spills are low, such a spill could occur. Any such spill would be a single pulse and quickly dissipated, particularly during rainy days. Regardless of weather, park maintenance staff would be notified if a spill would occur and clean up activities would take place immediately. Any spill would be a short term and negligible cumulative impact to regional water quality.

Park staff would be required to monitor and pump the lagoons and eventually the park would be required to discontinue using the lagoons due to violations. Should these lagoons be removed from service, the entire Desert View wastewater treatment facility would almost certainly be closed for an indeterminate period until adequate wastewater treatment services could be designed, constructed, and started. During this period, the Desert View developed area would probably be closed to visitor use due to lack of adequate wastewater treatment facilities. Such closure would have an adverse cumulative impact on visitors in the park and throughout the region; the recreational experience of visiting this portion of Grand Canyon NP would be removed. Cumulative impacts would also occur to local, and to a lesser extent, regional, concessions (small business) at Desert View should the wastewater treatment facility be closed. Visitors would not be able to stop and partake of offered services and goods.

Alternative B – Proposed Action

The Proposed Action calls for an improvement to the Desert View wastewater treatment facility and a surface discharge of about 4.9 gallons per minute of treated wastewater (swimming pool quality) during the design year of 2019 (see Alternatives section for further description). There would be short-term cumulative impacts on park visitors due to construction activities and traffic during the improvement period. There would be long-term positive cumulative impacts to visitors, concessions, and park operations because the improvement of the Desert View facility is being planned to accommodate future use and to comply with ADEQ and the EPA discharge permit requirements. Thus, the dependability and service of the wastewater treatment facility for park and regional visitors would be extended for decades.

There would be negligible impacts to biotic communities because of improving the Desert View wastewater facility itself. Work would affect about 1/4 acre of previously disturbed Juniper/Big

Sagebrush/Pinyon Pine association habitat. The return to less than one third of the historic discharge may allow non-native mesic plants to persist and may potentially attract various animals. There may be long-term, minor impacts on the foraging behavior of the peregrine falcon, California condor, and Mexican spotted owl.

There would be cumulative impacts to historical and archeological features associated with Desert View. Project undertakings would (or could potentially) adversely affect significant archeological resources possessing valuable cultural information regarding the activities and subsistence/occupation strategies of historic period Navajo and prehistoric Ancestral Puebloan peoples. Loss or disturbance of these finite numbers of sites would incrementally diminish the overall understanding of these cultural periods. Archeological data recovery would assist in mitigating site impacts by permitting the controlled collection and analysis of significant cultural material before construction disturbance.

Conclusion: The Proposed Action, in comparison to the historic action of discharging almost 3 times the amount of treated water into the drainage, would result in minor long-term impacts to natural and cultural resources.

Impact Topic	Alternative A No Action	Alternative B Proposed Action
Biotic Communities	There would be no new adverse impacts to biotic communities.	About 1/4 acre of previously disturbed Juniper/Big Sagebrush/Pinyon Pine association habitat would be impacted, almost all of which is presently impacted through past use and development. Populations of affected species would be slightly and temporarily lowered during construction; however, once construction was completed and mitigation measures employed, population levels would be expected to recover. Overall, improvements at the Desert View treatment facility itself would have negligible short-term impacts to biotic communities. <u>Discharge Site:</u> The proposed action would reintroduce discharge (after a 2 yr hiatus) to an ephemeral drainage that conveyed almost 13 gallons per minute for 30 years. Discharge would occur at a reduced rate of 4.9 gallons per minute. There may be minor long-term impacts to biotic species.
Threatened and Endangered / Special Status Species	No short or long term impacts to any special status species would be expected.	<u>Peregrine falcon</u> - Construction activities associated with improving the Desert View treatment facility itself would not be expected to adversely affect foraging or nesting behavior of peregrine falcons. <u>California condor</u> - Suitable nesting sites within 1 mile of Desert View would be inspected previous to and during construction. If an active condor nest is discovered, mitigative consultation would be initiated with USFWS <u>Mexican Spotted Owl</u> There would be no impact to spotted owl nesting or roosting habitat. Desert View development is not likely to adversely affect the spotted owl.
Cultural Resources	There would be no effect to identified archeological resources if wastewater treatment facility improvements were not undertaken. Long-term measures would be implemented to ensure that	Proposed facility improvements would result in moderate long-term effects on two archeological sites in the ¼ acre project area. The NPS would mitigate adverse effects by data recovery excavations carried out in advance of construction, and in accordance with a plan approved in consultation with the Arizona State Historic Preservation

	archeological sites are avoided by ongoing maintenance activities.	Office and concerned tribal officials.
Water Quality	If an inadvertent discharge would take place, it would be a short-term event, quickly dissipated with negligible impact to the adjacent habitat. The park would continue pump excess effluent from the lagoons for treatment at the South Rim WWTP.	All NPDES and ADEQ surface discharge requirements for treated effluent would be met. There would be negligible short-term impacts to water quality should this alternative be implemented.
Visitor Experience		There may be minor short-term impacts to the visitor experience during construction from traffic delays due to construction traffic. There would be moderate long term positive effect on the visitor experience due to little possibility of treatment failure or the potential of shutting it down because it would meet all state and federal water quality standards
Park Operations	There would be long-term moderate impact on park operations. ADEQ and OSHA limits would continue to be exceeded. Park staff would still be required to pump the lagoons and truck effluent to the South Rim WWTP. Park staff would spend more time and funds searching for other control methods than would have been spent should the proposed action be implemented, with no guarantee of success. If the treatment facility is closed for any amount of time the Desert View developed area could also be closed. Additional staff would be required to manage detour traffic and inform visitors the site is closed.	There would be moderate long-term positive impacts to park operations because the improved treatment facility would comply with alarm requirements of ADEQ and OSHA air chamber inspectability requirements. The proposed facility would be more cost effective, both in terms of operating dollars and operation time, over the present system and result in a substantial decrease in annual operation and maintenance costs over present conditions. Park protection ranger staff would not be required to manage traffic due to area closure. This alternative would cost ~\$760,000.

SELECTED REFERENCES

Executive Orders

Executive Order 11988 (Floodplain Management)

Executive Order 12898 (Environmental Justice)

National Park Service, U.S. Department of the Interior

Director's Orders

DO-2 (Planning Process Guidelines)

NPS 12 (DO-12) (National Environmental Policy Act Guidelines)

DO-28 (Cultural Resource Management)

US Federal Government

36 CFR 800.11

40 CFR, Part 503

1864 Act of Congress (13 Stat. 325)

1890 Act of Congress (26 Stat. 650)

1906 Joint Resolution of Congress (34 Stat. 831)

1955 Federal Air Quality Law

1963 Clean Air Act, as amended

1964 Wilderness Act

1966 National Historic Preservation Act

1969 National Environmental Policy Act (NEPA)

1973 Endangered Species Act, as amended

1977 Clean Water Act

1979 Archeological Resources Protection Act

1984 Archaeological Resources of Grand Canyon National Park (Multiple Resources Partial Inventory: Prehistoric and Historic Archaeological Sites, Historic and Architectural Properties. Draft.

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1990 Native American Graves Protection and Repatriation Act

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2000 Section 7 Consultation for Proposed Revisions to Flight Rules in the Vicinity of Grand Canyon National Park, Biological Opinion. January 26, 2000. US Fish and Wildlife Service, Phoenix, Arizona.

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APPENDIX

Figure 1. Vicinity Map

List 1. List of Special Status Species, Us Fish and Wildlife Service

Table 1. Desert View Water Use, Current and Future Projections*

CURRENT**							FUTURE***			
Month	Without Conservation			With Water Conservation			Public	Residence	Total	Daily Flow
	Public	Residence	Total	Public	Residence	Total				
Oct	190,000	143,000	333,000	85,000	129,000	214,000	149,000	194,000	343,000	11,000
Nov	62,000	119,000	180,000	28,000	107,000	135,000	48,000	160,000	209,000	7,000
Dec	54,000	124,000	178,000	24,000	111,000	136,000	43,000	167,000	210,000	7,000
Jan	48,000	151,000	199,000	22,000	136,000	157,000	38,000	204,000	241,000	8,000
Feb	58,000	125,000	184,000	26,000	113,000	139,000	46,000	169,000	215,000	8,000
Mar	152,000	115,000	267,000	69,000	104,000	172,000	120,000	155,000	275,000	9,000
Apr	166,000	142,000	309,000	75,000	128,000	203,000	131,000	192,000	323,000	11,000
May	246,000	160,000	406,000	111,000	144,000	255,000	194,000	216,000	410,000	13,000
June	276,000	161,000	436,000	124,000	145,000	268,000	217,000	217,000	434,000	14,000
July	321,000	175,000	495,000	144,000	157,000	302,000	253,000	236,000	488,000	16,000
Aug	309,000	154,000	463,000	139,000	139,000	278,000	244,000	208,000	452,000	15,000
Sep	254,000	136,000	390,000	114,000	122,000	237,000	200,000	183,000	383,000	13,000
	2,136,000	1,704,000	3,840,000	961,000	1,535,000	2,496,000	1,683,000	2,301,000	4,000,000	11,000

* Engineering Report of January 8, 1999; Improvements for South Rim and Desert View Wastewater Facilities, Grand Canyon National Park.

** Current water use is based on data for October 1996 through September 1997 water meter readings as described in the February 19, 1998 Thomas L. Harrington fax memo.

*** Future water use projections with conservation and growth based on NPS projections using a study period to 2019. Visitor use is expected to increase 75% between now and 2009 and then remain constant through 2019. Over all residential use during the study period is expected to increase 50%. However, recently park plans have changed and the GMP-approved 70 replacement and new housing units at Desert View would likely be constructed in the next several years, almost doubling the projected peak flow month of July 2019 to 32,000 GPD.